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CANARY CURRENT LARGE MARINE ECOSYSTEM (CCLME) PROJECT

**CCLME Inception Workshop
2-3 November 2010, Dakar, Senegal**

Invited Presentation

The social-ecological system approach A concept to assess the consequences of climate alterations on fishers communities

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Abstract

This presentation is focused on a methodological proposal for adaptation of social-ecological systems governance allowing to reduce vulnerabilities and to increase the capabilities of fishers communities impacted by environmental alterations. A five-step approach is developed: the assessment of environmental alterations on communities, the categorization of social-environmental vulnerabilities of communities, the assessment of capabilities, the pointing out of societal resilience factors, the adaptation of the social ecological systems governance to face up to environmental alterations with the analysis of effects of national or regional public policies, with the analysis of impacts and adaptability of local governance facing environmental alterations, with a special focus on the capacity of protected areas to be an option for a better adaptation of social-ecological systems governance facing environmental alterations.

A method is described: the observation units, a compilation of documents relating to livelihoods strategies of selected communities, a compilation of development plans relating to public policies and of institutional and judicial texts on local governance of selected social-ecological systems, a completion of the social-ecological governance analysis framework by defining the problems that governance raises, a completion of village monographs, a carrying out of an household sample-based survey relating to the perception of environmental alterations, the categorization of socio-environmental vulnerabilities, household functionings and capabilities, societal resilience factors, a mapping of environmental alterations and of communities socio-environmental vulnerabilities.

Two possible case studies are presented: the Imraguen social-ecosystem of the Banc d'Arguin National Park, the Bamboung marine protected area social-ecosystem.

Key words

Social-ecological system, climate alterations, fishers communities, economic vulnerabilities, capabilities, societal resilience, governance

1. Some definitions

A **social-ecological system** is characterized by dynamic interactions between an ecosystem and human communities. The notion of social-ecological system is highly pertinent when the communities are greatly dependent on environmental conditions and natural resources for their livelihoods (Berkes & Folke, 1998 ; Walker et al, 2002; Ostrom, 2009).

The governance is the whole of public and private interactions initiated to solve societal problems, to create societal opportunities. The governance includes the formulation and application of principles guiding those interactions. (Kooiman and Chuenpagdee, 2005). Societal includes everything which refers to the structure, the organization or the functioning of a society

The functioning is an achievement of a person: what she or he manages to do or be, a functioning refers to the use a person makes of the commodities at his or her command (Sen, 1999)

A **capability** reflects a person's ability to achieve a given functioning (doing or being.) (Sen, 1999)

The livelihoods: the whole of capabilities, assets (including both material and social resources) and activities required for a means of living (Carney, 1998).

2. Utility and objective of this approach

Utility: a concept tool to assess the impacts of environmental alterations on human communities because the use of ecosystem goods and services involves endogenous modifications or modifications resulting from external forcing to which the communities have to adapt.

Objective of this approach: a methodological proposal for adaptation of social-ecological systems governance allowing to reduce vulnerabilities and to increase the capabilities of fishers communities impacted by environmental alterations.

3. A five-step approach

3.1. The assessment of environmental alterations on communities

A focus on the modifications of ecosystem goods and services linked to these alterations

A retrospective livelihoods strategies analysis (thirty years) taking in count the environmental variations and focused on the evolution of sensibility points

This assessment helps to identify and localize the impacted communities, the type and level of this impact for each main livelihood

3.2. The categorization of social-environmental vulnerabilities of communities

A description of the chain of causes, and of the hierarchization of causes in distinguishing between distant "root" causes and unsafe conditions (Wisner et al, 2004)

The drawing of a vulnerability matrix proposed by Cannon (2000) which points out the components of the vulnerabilities, the variables, the socio-economic and technical determinants.

The assessment of livelihoods vulnerability indexes (Hahne et al, 2009) and economic vulnerability indexes of households (Devereux, 2001; Béné, 2010)

3.3. *The assessment of capabilities*

This assessment is linked to the diverse combinations of functionings that an individual or an household can implement (Sen, 2000), for example in front of environmental alterations. Two major groups of components have to be taken in count :

- the perceptions and general socio-economic consequences of these alterations
- the revenue variability, the activity diversification, the level of insertion within social networks, the external help (mutual aid and monetary transfers), the formulation of projects for the future (Gondard-Delacroix et Rousseau, 2005)

3.4. *The pointing out of societal resilience factors*

The drawing of a DROP model (*Disaster Relience of Place Model*) which helps to have a better understanding of the resilience of a community facing natural disasters including environmental risks or alterations (Cutter et al, 2008). Societal resilience is defined as the capacity of a social system to react facing to alterations, risks or disasters. We can point out two steps for the research effort:

- the identification of resilience factors in distinguishing between inherent resilience (diversification of activities, informal insurance mechanisms, free loans, monetary transfers) and the adaptive resilience (decrease of inputs etc.)
- the identification of resilience indicators (Schneiderbauer and Ehrlich, 2006 ; Paton and Johnston, 2006).

3.5. *The adaptation of the social ecological systems governance to face up to environmental alterations*

The analysis of effects of national or regional public policies considered as driving forces. The study of structural effects of national or regional public policies on social-ecological systems governance has to be focused on the consequences of development plans.

The analysis of impacts and adaptability of local governance facing environmental alterations. The study of modalities of local governance adaptability has to point out the failures, the various answers depending of the type, the extent and consequences of alterations (Ostrom, 2009 ; Anderies et al, 2004).

A special focus on the capacity of protected areas to be an option for a better adaptation of social-ecological systems governance facing environmental alterations

4. A method

The observation units are the household and the village community as an aggregation of households having in share the same social-ecological system

A compilation of documents relating to livelihoods strategies of selected communities to point out sensibility points as observed during the last thirty years

A compilation of development plans relating to public policies

A compilation of institutional and judicial texts on local governance of selected social-ecological systems, of activity reports from institutions involved in local governance

A completion of the social-ecological governance analysis framework by defining the problems that governance raises, classifying the actors of governance, describing the norms which governance complies with, identifying nodal points where the actors' strategies confront, reconstructing the process having led to the governance system

A completion of village monographs on the environmental alterations, socio-environmental vulnerabilities, functionings and capabilities, as well as societal resilience factors at the level of the community

A carrying out of an household sample-based survey relating to the perception of environmental alterations, the categorization of socio-environmental vulnerabilities, household functionings and capabilities, societal resilience factors

Mapping of environmental alterations, and of communities socio-environmental vulnerabilities

5. Case studies in West Africa

➤ The Imraguen social-ecosystem and the governance of the Banc d'Arguin National Park

As far as the coastal and maritime domain is concerned, the PNBA is characterized topographically by a continent-ocean interface with little relief, as the Saharan desert disappears into a fairly shallow marine area (5 metres of water at 50 km distance from the coast). From a hydrological point of view, the subsequent rising to the surface of the colder deep waters which are rich in mineral and organic nutritional elements (*upwelling*), engenders a high level of biological productivity.

As far as the terrestrial domain is concerned, all the different types of desert landscape are represented in the Park: areas of quick dunes (ergs), strings of North-east/south-west facing dunes made up of barkanes, vast groups of stable ogolian dunes, interdunars, former oued beds covered in vegetation and overthrusting zones, sandstone slabs and limestone ridges, evaporation basins in the salty clayey-sandy soil. Despite the prevalent aridity of the area, there is an astonishing variety of flora.

Pastoralism has always been the main activity of the populations that inhabit this area from time to time in keeping with the fluctuations of the pasturable areas. However, a small group of multi-ethnic people called Imraguens, who are estimated to number 1 500, have turned towards the exploitation of fishing resources. These people began fishing according to a seasonal rhythm (mullet fishing), then, more recently all through the year as a result of the sedentarization phenomenon begun in the middle of the 20th century.

In the case of Banc of Arguin, powers regulating access are deferred to the administration of PNBA through a deliberation and decision making process, which is, on the one hand, tribal customary (*jama a*) and gathers members of different statuses according to codified rules, and on the other hand, relevant to participatory and communal development approach (discussion workshops). A hierarchical model with a predominance of the paradigm of authority characterizes the governance of the *Parc National du Banc d'Arguin* (PNBA), as the State is placed at the center of decisions, and acts in collusion with the tribal hierarchies, which tends to reduce or exclude the depending populations from the management, even if they take part in the deliberations which remain quite theoretical.

➤ The Bamboung marine protected area social-ecosystem and its governance

The history of the populating of the Bamboung MPA emphasizes the fact that this region was only relatively recently populated. Thus there was a relatively homogenous population until the XIXth Century, but at the beginning of the XXth Century there was a considerable influx of immigrants and this continued up until the 1950's. This explains the ethnic diversity that is to be found. In contrast to this, the available data shows that the roots of the Seerer identity, and those of the few Socés who see themselves as *Nyominka*, (agricultural fishermen who live near water) are based either on lifestyle or ethnic belonging.

In view of the diverse lifestyles and ethnic groups there is also the difficulty of the emergence of the identity of resident of this MPA. This may be used to legitimize the regulations concerning the sustainable exploitation and valorization of the natural renewable resources.

Some of the means of traditional management of the land can be seen as components in the local governance of this marine and coastal protected area. Firstly, in the oldest Seerer or Socé villages there is the recognition of the traditional mastery of land and sea. This is possessed by the *Alcalis* (masters of land and sea) and is accompanied by the power to allocate the use of cultivable land and the claim to village rights over part of the sound and some of the *bolongs* (channels). In almost all the tribal traditions, there is the concession of a right to use land and there are also bans on the use of certain resources. This shows that the natural environment is managed as an integral part of the traditional cosmogony: in certain villages and in the eyes of some inhabitants land trees and animals are still considered to be major divinities or sacred things. Beliefs linked to the natural environment and to indigenous knowledge (naturalistic or other) make up the roots of Seerer or Socé identity. On which are traditionally decreed certain practices or bans which induce the conservation of natural renewable resources either deliberately or by chance. Nevertheless, pressure from the demand for smoked fish, and for wood from the mangrove (for fish smoking, construction and cooking) and the arrival of new immigrants makes the application of these traditional environmental regulations more and more problematic for the MPA.

In the case of Bamboung community-based marine protected area, powers regulating access are exercised both by decentralized services of the State and by rural communities creating an overlapping of responsibilities. The absence of a clear designation of a leader institution in charge of the management of this MPA explains only partially the existing situation. These are rival legitimate interests, which reveal the difficulty to hang together the paradigms of authority and of mutual confidence, that characterize the governance of the Bamboung community-based marine protected area. In fact, the numerous bodies producing standards and regulations tend to create problems for the regulation of the access to renewable natural resources.

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